

Overly optimistic adder, *Vipera berus* (Linnaeus, 1758), killing and intending to swallow an oversized young hare, *Lepus europaeus* Pallas, 1778

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Abstract

In snakes, predatory attacks on oversized prey are not uncommon. Here, we describe an adult female *Vipera berus* that likely bit and intended to swallow an oversized young hare, *Lepus europaeus*. The estimated mass of the hare was about 10 times greater than that of the viper. The event took place in Denmark, on 10 August 2022. We suggest that the adder under these circumstances might have benefited from a large prey to gain maximum energy after likely having given birth. Greatly oversized prey items killed by snakes are poorly known in literature. Based on published and unpublished reports, we add to the knowledge of snakes' killings and subsequently abandoning oversized prey items. It may be an underdocumented phenomenon.

Key Words

oversized, predation, prey, Squamata, Viperidae

The Common European Adder, *Vipera berus* (Linnaeus, 1758) has the largest distribution of any terrestrial snake species. Its range extends from Great Britain (excluding Ireland) across most of Europe, through Russia to Sakhalin Island in the east and from the Balkan Peninsula in the south up to north of the Arctic Circle in Sweden, Finland, and the Kola Peninsula. This species is likely the most thoroughly researched snake in the world (Otte et al. 2020). Females generally attain total lengths of 60–65 cm, seldom more than 70 cm, and with a record of 104 cm (Nilson et al. 2005; Otte et al. 2020; Bringsøe et al. 2021). *Vipera berus* is a generalist predator, primarily consuming a variety of small mammals, birds, lizards, and amphibians (Nilson et al. 2005; Otte et al. 2020).

Here we report a chance observation of an adult female *V. berus* killing and failing to swallow a much larger prey, a young *Lepus europaeus*, European Hare. The

observation was made by KB on the island of Læsø in the Kattegat, northern Denmark, 10 m from a sandy beach, on 10 August 2022 at 13:53–13:57 h local time (coordinates: 57.299°N, 10.934°E; datum WGS 84; altitude 2 m a.s.l.). The surrounding habitat consisted of a dirt road in an open grassland with heather on sandy substrate, with scattered human habitations. Læsø covers an area of 118 km² where *V. berus* is commonly seen (Kirkeby 2007).

Four videos form the basis of this observation (Suppl. materials 1–4). The two photos (Fig. 1A, B) were created from Suppl. material 4 (video S4).

At 13:53 h the observer found an adult female adder examining a young hare (a leveret) and biting its left hind leg. The hare was lying on the ground, moving its four legs jerkily and its head with difficulty, and was unable to stand up. The adder was disturbed by the observer's presence and escaped into the tall grass (Suppl. material 1;

27 s). Within seconds, the adder returned from the grass vegetation to the hare and continued examining it, especially the front legs and the head (Suppl. material 2; 42 s).

The adder escaped into the grass again as the observer moved around (Suppl. material 3; 20 s).

Again, the adder returned to the hare within 20 s and examined it carefully and energetically, starting typically with the posterior parts and it bit and moved the right hind leg. Then the adder continued examining the anterior parts of the hare. It bit and pulled a front leg and subsequently also bit the hare's head. The hare was still breathing but moved less than before (Suppl. material 4; 103 s). The observer then deliberately chased the adder away and took the hare trying to save its life, but it died after approx. 30 minutes.

The female adder appeared to be in a low nutritional status, probably after having recently given birth.

It remains an open question whether the adder would have tried to swallow the prey had the observer not intervened. Forsman's and Lindell's (1993) experiments showed that when an adder is presented with a large prey, it assesses its size by moving its snout over the prey and then pushes and pulls it. This corresponds well with the behaviour we recorded. After such an examination, an adder might either attempt to swallow a large prey or refrain from doing so (Forsman and Lindell 1993).

We find it likely that the individual on Læsø would have abandoned its excessively large prey after careful examination. Based on comparisons with the surrounding vegetation visible in the videos (especially Suppl. material 2), the total length and body mass of the adder have been roughly estimated to be 60 cm and 110 g respectively and those of the hare at 30 cm and 1000 g, respectively. We estimated the adder's size also considering that the total length of females normally does not exceed 70 cm and mass after parturition on average 100–110 g (Nilson et al. 2005). Zörner (1981) provided extensive morphometrics data on *L. europaeus* from throughout its range, notably on body mass, aiding us in estimating the leveret's mass. The adult mass ranges from 2500 to 6500 g, with a maximum of 8000 g, with full size attained after four to six months. Mass at birth is approx. 100–150 g. The age of the observed leveret is estimated to approx. three months.

Mustela nivalis, Least Weasel, and *Glis glis*, European Dormouse, constitute particularly large prey of *V. berus* (Dürigen 1897; Bringsøe 2019). Frazer (1983) provided a full-page photo of a *V. berus* swallowing a Merlin chick, *Falco columbarius*, on the ground which we, however, consider staged and dubious.

Kornilev et al. (2023) provided an extensive review of mortality in snakes caused by ingestion or attempted

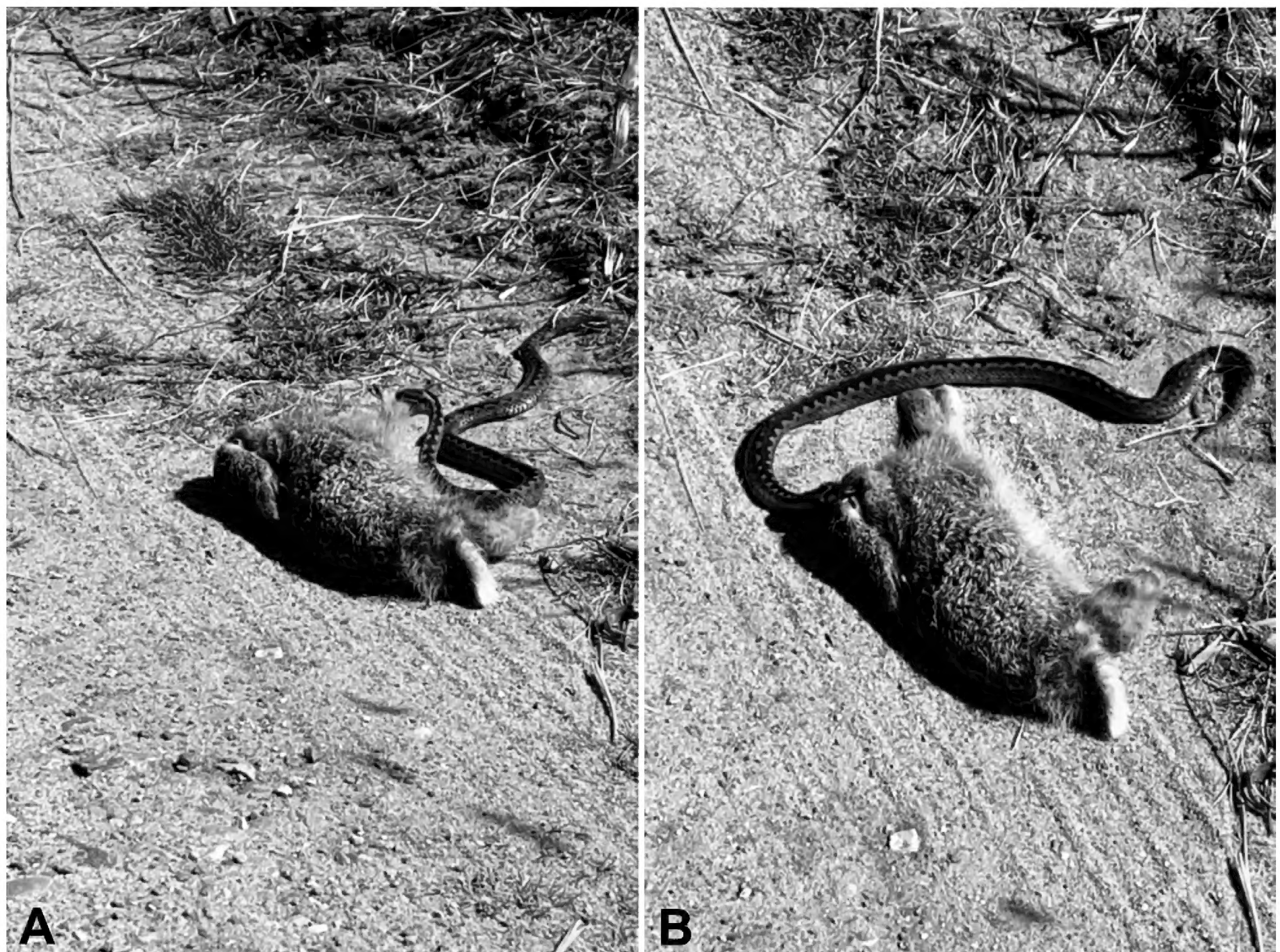


Figure 1. The female *Vipera berus* with the dying leveret, *Lepus europaeus*. Still photos created from Suppl. material 4: video S4. **A.** Biting and pulling a front leg. **B.** Examining and apparently biting the head. Photos by KB.

consumption of injurious prey. 101 publications describing at least 143 cases of mortality under diverse circumstances were included. Oversized prey comprised 40.6%, of which reptiles and fish formed 33% and 26%, respectively, mammals were only 16%. Another example of oversized prey, but with a certain function was suggested by Shine et al. (2002): on the island of Shedao off north-eastern China, small *Gloydus shedaoensis* frequently kill birds larger than they themselves can swallow, but subsequently larger conspecifics scavenge the birds' carcasses. Additionally, large vipers kill raptorial birds that pose little or no threat to themselves, but this behaviour reduces predation risk for smaller individuals. *Boiga irregularis* has an immense negative impact on the native Micronesian Starling, *Aplonis opaca*, on the island of Guam where this snake has been introduced (Kastner et al. 2024). Nearly half (47.95%) of the ingestion attempts on fledgling birds were unsuccessful because they were too large and all of them were killed.

It is unusual that snakes regularly attack vastly oversized prey items which are obviously impossible to swallow. However, in a possibly unique scenario, two southern African spitting cobras, *Naja mossambica* and *N. nigricincta nigricincta*, frequently enter houses and bite sleeping humans at night, normally on the hands or feet (Tilbury 1982; Vermaak et al. 2010; Saaiman and Buys 2019, 2022; Saaiman et al. 2023). The bites are clearly predatory attacks, probably because the snakes smell mammals, and not just snakes seeking heat or accidentally being rolled over (Marais 2022; pers. comm. 2025). The victims comprise between 10 and 30 times the cobras' masses.

Further, earlier observations of snakes overestimating their abilities to swallow too large leporid prey (hares or rabbits) are known and they can even lead to the death of the serpent predators as *Pituophis catenifer* and *Zamenis scalaris* were attracted to young rabbits which they attacked, but they died while trying to swallow them (Howard 1949; García-Roa 2020). When it comes to European vipers, *Vipera ammodytes* may eat newborn rabbits whereas juveniles eat e.g. large centipedes which can even kill them after ingestion (Arsovski et al. 2014; Tomović et al. 2022). Bull (2016) found a dead *V. berus* (SVL 355 mm, total length 402 mm) which had just swallowed a large Field Vole, *Microtus agrestis*. The mass of the prey was 26 g and the snake's mass after the prey had been removed was 28 g. The adder had therefore consumed a meal equivalent to 92.9% of its mass.

Moreover, in Red Cliffs Desert Reserve, St. George, southwestern Utah, USA, Cameron Rognan made four previously unpublished observations on rattlesnakes killing oversized prey items. A male *Crotalus lutosus* killed a young almost full-size *Sylvilagus audubonii* (Desert Cottontail) but failed to swallow it (Suppl. material 5: fig. S1). Predation took place in late April 2023 and was probably its first meal attempt during the spring. *Crotalus lutosus* mainly feeds on a wide array of rodents, to a lesser extent cottontails of the genus *Sylvilagus*, birds, lizards and seldom anurans (Glaudas et al. 2008).

The three other cases deal with the Sidewinder *Crotalus cerastes* (Rognan, pers. comm. 2024). First, in mid-July 2012 a large bat, probably *Tadarida brasiliensis* (Mexican Free-tailed Bat), was found dead near the burrow of a gravid Sidewinder which gave birth a few weeks later. The observer sometimes saw such bats flying low to the ground where the female Sidewinder most probably killed and tried to eat this bat. The bat had not been scavenged or had been dead on its own because it looked well chewed on and had left tracks in the sand. The rejection of the bat was according to the observer probably because it was too big to swallow, although it could not be ruled out that it had been affected by the gravidness of the snake. Second, in mid-September 2024, an adult Sidewinder killed but did not ingest a Kangaroo Rat (*Dipodomys* sp.). The third case from early July 2024 was similar as a semi-adult Sidewinder had killed a Kangaroo Rat, but it was unable to ingest it.

The above cases indicate that snakes killing and subsequently abandoning oversized prey items may well be an underreported phenomenon.

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Supplementary material 1

Video S1

Authors: Henrik Bringsøe, Daniel Jablonski, Klaus Birch

Data type: mov

Explanation note: The observer arrived and found an adult female adder, *Vipera berus*, examining a young hare or leveret, *Lepus europaeus* and biting its left hind leg. The hare was lying on the ground moving its four legs jerkily and head with difficulty and was unable to stand up. The adder was disturbed by the observer’s presence and escaped into the tall grass. The island of Læsø, Kattegat, northern Denmark, on 10 August 2022 at 13.53:21–13.53:48 h., duration 27 seconds. Recorded by KB.

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Supplementary material 2

Video S2

Authors: Henrik Bringsøe, Daniel Jablonski, Klaus Birch

Data type: mov

Explanation note: The adder returned from the grass vegetation to the hare and continued examining it, especially the front legs and the head. The island of Læsø, Kattegat, northern Denmark, on 10 August 2022 at 13.53:57–13.54:39 h., duration 42 seconds. Recorded by KB.

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Link: <https://doi.org/10.3897/herpetozoa.38.e143850.suppl2>

Supplementary material 3

Video S3

Authors: Henrik Bringsøe, Daniel Jablonski, Klaus Birch

Data type: mov

Explanation note: The adder escaped into the grass again as the observed moved around. The island of Læsø, Kattegat, northern Denmark, on 10 August 2022 at 13.54:57–13.55:17 h., duration 20 seconds. Recorded by KB.

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Supplementary material 4

Video S4

Authors: Henrik Bringsøe, Daniel Jablonski, Klaus Birch

Data type: mov

Explanation note: The adder returned to the hare and examined it carefully and energetically, starting with the posterior parts and it bit and moved the right hind leg. Then the adder continued examining the anterior parts of the hare. It bit and pulled a front leg and subsequently also bit the hare's head. The hare was still breathing, but moved less than before. The island of Læsø, Kattegat, northern Denmark, on 10 August 2022 at 13.55:39–13.57:22 h., duration 1 minute 43 seconds. Recorded by KB.

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Supplementary material 5

Crotalus lutosus having killed a *Sylvilagus audubonii* which it tried to swallow, but in vain

Authors: Henrik Bringsøe, Daniel Jablonski, Klaus Birch

Data type: jpg

Explanation note: **figure S1.** Male *Crotalus lutosus* having killed a young *Sylvilagus audubonii* (Desert Cottontail) but almost of full size which it tried to swallow, however, it was unable to finish the job. It was probably its first meal attempt during the spring. St. George, southwestern Utah, USA, 29 April 2023 at 09:15 h. Photo by Cameron Rognan.

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Link: <https://doi.org/10.3897/herpetozoa.38.e143850.suppl5>